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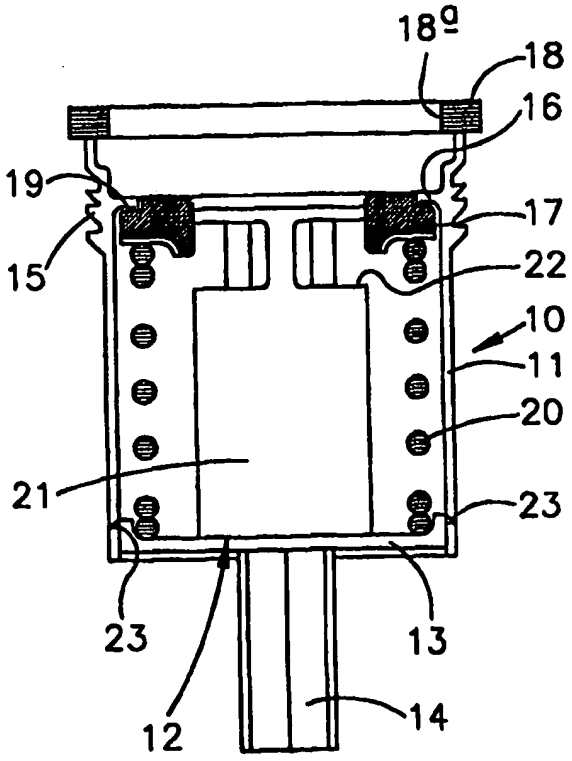
(54) Title: IMPROVEMENTS IN OR RELATING TO VALVES

(57) Abstract

A valve (10,25) for fitting in the top of a liquid container for use in the extraction of liquid therefrom comprises a generally cylindrical main body part (11,26) having a base (12,27) snap-fitted in the lower end thereof, with an extraction pipe (14,29) extending integrally from the base for liquid flow therethrough into the main body part. A sealing member (17,35:37) is spring biased normally to close an upper opening (34) of the main body part, and prevent outflow between the pipe (14,29) and said upper opening, the sealing member being movable however by an actuator (40) to open said upper opening (34) and to allow flow through the valve.



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IMPROVEMENTS IN OR RELATING TO VALVES

This invention relates to a valve, particularly a valve intended to be fitted into the top of a container, such as a drum, normally to provide an automatic sealing action between the interior and exterior of the drum, but being co-operable with an actuator outside of the drum to allow withdrawal of fluid from the drum interior to the exterior thereof. It has particular use with a drum containing chemicals.

It is known to produce this form of valve from stainless steel, various parts of the valve being welded together so that thereafter the valve cannot be dismantled.

An object of the invention is to provide an improved valve.

According to the invention a valve comprises a first body part defining a chamber, there being a first opening between the interior and the exterior of the chamber which is normally closed by sealing means, and a second opening between the interior and the exterior of the chamber having fitted thereat a second body part allowing communication between the interior and the exterior of the chamber, wherein said second body part is releasably fitted at said second opening.

Preferably said second body part is releasably engageable with said first body part. Conveniently the second body part is releasably fitted at said second opening by means of catches. Conveniently the second body part is a base of

the valve, and advantageously it has an integral extraction pipe spigot depending therefrom.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic, part-sectioned internal side view of a valve of the invention;

Figure 2 is an enlarged, fragmentary view of a catch of one of the components shown in Figure 1,

Figure 3 shows, in a similar manner as Figure 1, an alternative embodiment of a valve of the invention, together with an actuator for opening the valve, and

Figures 4 and 5 show the actuator in mated, valve closed, and valve open positions respectively.

A valve 10 of the invention, shown in Figure 1, is particularly intended for use in the top of containers, for example containers in the form of chemical drums. This form of valve has previously been produced from stainless steel with component parts thereof being welded together such that after assembly it has not been possible to dismantle it. This is disadvantageous in that it is thus not possible refurbish or repair the valve and/or component parts thereof. This type of valve is not intended to be used with pressurised fluids, the arrangement being that fluids are extracted from the container to which

the valve is fitted by means of a vacuum once, as will be explained, the seal of the valve has been unseated.

The form of valve shown in Figure 1 is generally cylindrical having a body made up of a generally cylindrical hollow first body part 11 and a second body part 12 forming a base of the valve, said base comprising a generally disc-like closure part 13 from the centre of which depends a hollow extraction pipe spigot 14, this spigot extending to the inner surface of the closure part 13 to permit entry of fluid into the valve from the container to which the valve is fitted, normally at the highest point thereof. The first and second body parts would normally be made of the same or different thermoplastic materials. The outer surface of the lower part of the first body part 11 is plain, but adjacent its upper end there is provided an external screw thread 15 therearound, for engagement with a complementary internal screw thread at the opening in the top of the container into which the valve is fitted, in use. At this screw thread, the internal surface of the first body part 11 is formed with a short, inwardly directed inner annular flange 16 which, as will be explained, forms a stop for an annular seal 17 within the valve. The first body part 11 extends upwardly beyond the screw thread 15, this upward extent still being of hollow cylindrical form, but being of an internal diameter somewhat greater than that of the body part below the flange 16. At its upper extremity, the first body part is formed with a thickened annular flange 18 having a central circular opening 18a therethrough, the diameter of which corresponds substantially to the outer diameter of the section of the first body part 11 below the flange 16.

As stated, the seal 17 is of annular form, with its uppermost outer peripheral side portion being recessed to form an annular ledge 19 which, as will be described, normally sealingly engages against a part of the underside of the annular flange 16. In this way a chamber is defined within the first body part 11 below this seal, the lower part of the chamber being effectively defined by the closure part 13, notwithstanding that fluid can flow into said chamber, as will be described, initially via the spigot 14. The seal has an external diameter which is less than the internal diameter of the section of the first body part below the flange 16.

A coiled compression spring 20 is disposed within the chamber defined between the seal 17 and the closure part 13, with one end of its coils engaging the underside of the seal 17, and the other end of its coils engaging on the inner surface of the closure part 13, the diameter of the coiled spring being just less than the internal diameter of the chamber, so that the spring is disposed adjacent the inner wall of the chamber.

Formed integrally with the closure part 13, and extending away from the inner surface thereof in a direction opposite to the direction of extent of the spigot 14, but being co-axial therewith, is a member 21 which externally acts as a guide and internally provides a flow passage in communication with the spigot 14 to direct fluid into the chamber. To this end the member 21 has a cylindrical external surface, which however is interrupted near its upper end to provide one or more lateral openings 22 which communicate with the axial flow passage internally of the member 21 which extends from the spigot 14. In this way, in the state shown in Figure 1, fluid entering the spigot 14 can pass through said flow passage in the member 21 and then out through said

openings 22 into said chamber. The external diameter of the member 21 is substantially equal to the internal diameter of the seal 17, so that, as will be described, the seal can move up and down within the chamber whilst forming a seal with the external surface of the member 21 and being guided thereby. As shown, the uppermost part of the member 21 can be formed with a downwardly facing short annular shoulder to engage with a corresponding upwardly facing short annular ledge at the inside of the seal, to produce the same effect as that between the flange 16 and ledge 19, namely to prevent further upwards movement of the seal.

As can be seen in Figure 1, the lower end of the first body part 11 extends slightly below the lower surface of the closure part 13. The outer periphery of this part 13 is formed at its upper end with a plurality of circumferentially spaced, outwardly directed catches 23 which are arranged to engage in corresponding recesses or holes in the interior surface of the first body part 11 adjacent its lower extremity, this engagement being schematically shown between the first body part 11 and the second body part 12, incorporating the closure part 13, in Figure 1. To release the body part 12 from the first body part 11 it is necessary to dilate the body part 11 sufficiently to release the catches from the holes or recesses on the interior surface thereof. Preferably this dilation is effected immediately below the base, i.e. at the portion of the first body part 11 which extends slightly beyond the lower, outer surface of the disc-like closure part 13. Re-assembly merely involves pushing the closure part 13 upwardly into the first body part 11 until the catches 23 engage in their associated holes/recesses as a snap fit. Figure 2 shows an enlarged detailed view of one form of catch, it being seen that there is a chamfered surface 24 to assist the snap-fit insertion process.

In use an actuator (not shown), specially shaped and constructed for sealing engagement in the top of the valve, is provided in order to enable fluid to be extracted from the container into which the valve is screwed as previously described. This actuator is of generally tubular form with an inner hollow portion having a diameter greater than the exterior diameter of the member 21, and an outer diameter less than the diameter of the circular inner opening defined in the flange 16. Accordingly this actuator can be pushed down into the top of the valve through the opening 18a until its lower annular wall surfaces engages on the upper annular surface of the seal 17. Continued downward movement of the actuator will move the seal downwardly in the valve chamber against the force of the compression spring which accordingly is compressed. Whilst the inner surface of the annular seal will engage against and be guided by the outer surface of the member 21, fluid already in the chamber will be able to escape around the outer peripheral surface of the seal when a vacuum is applied to the actuator, this liquid passing upwardly through the annular opening defined between the member 21 and the flange 16 which is normally occupied by the seal. In one arrangement the lower outer surface of the actuator is provided with one or more openings to allow the liquid to flow to the interior of the actuator from where it is then extracted upwardly by the vacuum referred to. The holes can be arranged with mesh or other filter material to prevent solid impurities being extracted along with the liquid or fluid. Moreover once the seal has been pushed sufficiently far downwardly so as to clear at least part of the openings 22, fluid can flow upwardly through the member 21 from the spigot 14 and thence out through the annular openings normally covered by the seal, in the same manner as already described for liquid originally present in the

chamber. It will be appreciated that the pipe spigot will have fitted to it a flexible hose or other tubing extending downwardly into the container. Once sufficient liquid has been extracted, the actuator is withdrawn upwardly, thereby allowing the spring 20 to re-seat the seal 17 in its Figure 1 position, thereby again placing the valve in its closed position.

It will be appreciated that as compared to the described equivalent known type of valve, the present valve is advantageous in that it is possible to dismantle it into its component parts in that there are no irreversible assembly procedures. Accordingly by removing the second body part 12 as described, by releasing the catches 23, the spring and/or seal can be replaced or repaired, and the flow path through the second body part 12 can be cleaned/cleared as required.

An alternative form of a valve of the present invention is shown in Figures 3 to 5, this valve being identified by the numeral 25. With this embodiment there is a cylindrical hollow first body part 26 and a second body part 27 forming a base of the valve. This base comprises a disc-like closure part 28 from the lower surface of which extends a hollow extraction pipe spigot 29, the passage defined in the pipe spigot 29 being continued through the closure part 28 so as to define a central circular opening 30 therethrough so that when the second body part is fitted to the first body part, as will be described, fluid can flow from the container in which the valve is fitted, upwardly through the spigot 29 and thence directly into the first body part 26. As with the first embodiment, the first and second body parts would normally be of the same or different thermoplastic materials.

At the upper end of the first body part 26 there is provided an integral inwardly directed radial flange 31 with a central circular opening 32. Depending centrally from the underside of this flange into the interior of the body part 26 is an integral, hollow cylindrical housing 33 which has its lower end closed and terminating just above the base of the second body part 27 so that fluid can flow into the valve through the spigot 29 up to the closed bottom part of the housing 33 and thence around the housing 33 in the annular space between said housing and the interior surface of the outer cylindrical wall of the first body part 26.

As the interior diameter of the housing 33 is greater than the diameter of the opening 32, there is formed an annular stop 34 at the top of the housing 33, and normally a generally cylindrical seal 35 is biased by a compression spring 36 so that the upper surface of the seal engages said stop around the outer periphery of said upper surface of the seal, as shown in Figure 3. The seal includes a separate cylindrical disc-like member 37 forming a top part of the seal assembly, this being a close fit radially within the opening 32 and having the same axial depth thereas, so that the outer surface of the disc member is flush with the outer surface at the top of the body part 26 defined by the flange 31. The lower seal 35 of the sealing assembly has a depending annular skirt 38 which sealingly engages the inner surface of the housing 33. The coiled compression spring 36 has its one end extending into the skirt 38 and engaging the underside of the seal 35, whilst its other end engages the inner surface at the bottom of the housing, so as normally to bias the sealing assembly to its uppermost position where it engages against the stop 34. In the wall of the housing 33 at the upper part thereof is provided a plurality of peripherally spaced apertures 39, each aperture extending wholly through the

wall of the housing. Accordingly, as will be described, although the skirt 38 normally covers these apertures so as to prevent fluid flowing from the outside of the housing to the interior thereof, depression of the seal against its spring bias uncovers the apertures so that fluid can flow from the exterior into the interior of the housing and thence out through the opening 32 into an actuator 40 shown in Figures 3 to 5.

The actuator generally acts in a similar manner to the one described in relation to the first embodiment of the valve shown in Figure 1, but here, although it is of generally tubular form, it has its lower end closed so as to engage against the disc member 37 of the sealing assembly, the external diameter of the tubular actuator being substantially equivalent to the diameter of the disc member 37 as best shown in Figures 4 and 5. This closed end surface of the actuator is continued inwardly into the interior thereof to form a frusto-conical part 41 onto which is spring biased a mesh filter 42 which is generally cylindrical, being open at its upper end and having an aperture in its closed lower end, through which aperture the part 41 projects, so that the filter 42 is retained on this part 41 by the bias of a spring 43 within the actuator 40. The cylindrical wall of the mesh filter 42 is a close fit against the interior wall of the tubular actuator 40, with the filter thereby covering a plurality of angularly spaced apertures 44 extending through the wall of the actuator, these corresponding in position and size to the apertures 39 in the housing 33. The outside of the actuator is formed with a seal arrangement comprising an outer sealing member 45 through which the actuator can slide, and a lower O-ring seal 46 carried on the bottom of the member 45 for sealingly engaging the upper outer surface of the flange 31 when the actuator is placed in position on the valve 25, as shown in Figure 4.

Although not shown in the sectioned drawings of Figures 3 to 5, the base of the valve formed by the second body part 27 would be formed with catches in the same or a similar manner as the catches 23 of the second body part 12 of the valve of the first embodiment of the invention. Similarly the lower wall of the first body part would be formed with corresponding recesses or holes therein to receive said catches in the same manner as described with the first embodiment of the valve, and furthermore engagement and release of the catches would take place in the same manner by dilating the portion of the first body part 26 which extends below the level of the lower surface of the base of the valve. Thus again it is possible to dismantle the base from the main body part of the valve for refurbishment and/or repair, although with the construction of this second embodiment of the invention, repair/replacement of the sealing assembly and/or the compression spring does not depend upon removal of the valve base. With both embodiments, the catches could instead be on the first body part, with the corresponding recesses on the second body part.

Withdrawal of fluid from the container into which the second embodiment of the valve is screwed, by means of its exterior screw threads 47, can easily be appreciated from Figures 3 to 5. Figure 3 shows the actuator being brought down towards the upper surface of the valve, whilst Figure 4 shows it placed in position at said top surface. It can be seen that here the O-ring seal 46 engages the outer surface of the flange 31 whilst the closed lower surface of the tubular actuator engages the outer surface of the disc member 37. In this position fluid around the exterior of the housing 33 is prevented from entering the housing by virtue of the apertures 39 being blocked by the skirt

38 of the seal 35. However if the tubular actuator is now depressed, as shown in Figure 5, so that it slides within the outer sealing member 45, the sealing assembly is depressed, with the outer side of the skirt sliding down along the inside of the housing and compressing the spring 36. As the lower part of the actuator passes through the opening 32 from which the sealing assembly has been displaced, the position is reached, as shown in Figure 5, where the apertures 39, which have now been uncovered by downwards movement of the skirt 38, are axially aligned and also angularly aligned with the apertures 44 in the tubular actuator 40 so that fluid can now flow from the exterior of the housing, through the apertures 39 and thence through the apertures 44 and the mesh 42 into the interior of the tubular actuator, such fluid being drawn up through the actuator by vacuum, as with the first embodiment of the valve described. Again, the mesh is provided to prevent solid impurities from being withdrawn with the fluid passing upwards through the actuator 40. Once a sufficient quantity of fluid has been withdrawn from the container, the downwards force on the actuator 40 is removed, thereby allowing the sealing assembly to revert to its Figure 4 position under the bias of the compression spring 36, so that once again the valve is closed.

Although shown with screw threads, the valve with both embodiments could instead have a plain outer body with the valve being welded into the container, so that removal of the valve from the container is restricted, as is access to the inside or its contents other than by way of a proper extraction system. It will be appreciated that any convenient form of releasable engagement could be provided between the 'base' of the valve and the body part thereof and that release could be effected by means other than the

dilation of the body part below the base. Accordingly the body part could terminate flush with the outer surface of the base and removal perhaps being accomplished by squeezing or otherwise manipulating the main body part at a position above the 'base'. It will be understood that the valve of the invention could be used in 'reverse', with fluid being supplied into the container from the actuator, when this displaces the seal assembly.

CLAIMS

1. A valve comprising a first body part defining a chamber, there being a first opening between the interior and the exterior of the chamber which is normally closed by sealing means, and a second opening between the interior and the exterior of the chamber having fitted thereat a second body part allowing communication between the interior and the exterior of the chamber, wherein said second body part is releasably fitted at said second opening.

2. A valve as claimed in Claim 1, wherein said second body part is releasably engagable with said first body part.

3. A valve as claimed in Claim 2, wherein said releasable engagement is by means of catches.

4. A valve as claimed in Claim 3, wherein said catches are provided on said second body part.

5. A valve as claimed in Claim 4, wherein said catches are releasably engagable with corresponding recesses in the first body part as a snap-fit.

6. A valve as claimed in Claim 1, wherein said second body part is releasably fitted at said second opening by means of catches.

7. A valve as claimed in any one of Claims 4 to 6, wherein said catches are provided integrally on said second body part.

8. A valve as claimed in any one of Claims 1 to 7, wherein the second body part is a base of the valve.

9. A valve as claimed in any one of Claims 1 to 7, wherein said communication between the interior and the exterior of the chamber is by way of a hollow spigot.

10. A valve as claimed in Claim 8, wherein the base has an integral extraction pipe spigot depending therefrom to allow said communication.

11. A valve as claimed in any one of Claims 1 to 10, wherein said sealing means is biased so as normally to close said first opening.

12. A valve as claimed in Claim 11, wherein the biasing of the sealing means is by way of a spring received in said chamber around a member which guides the sealing means, in use, as it moves to open or close said first opening.

13. A valve as claimed in Claim 12, wherein said member has an internal flow passage to provide communication between the exterior of the chamber and said interior thereof.

14. A valve as claimed in Claim 13, wherein said member has at least one lateral passage communicating said flow passage to said interior of the chamber.

15. A valve as claimed in Claim 14, in conjunction with an actuator, in use, wherein movement of said sealing means to open said first opening by the action of said actuator can establish a flow path between said at least one lateral passage and the exterior of the chamber through said first opening.

16. A valve as claimed in any one of Claims 12 to 15, wherein said member is integral with said second body part.

17. A valve as claimed in Claim 11, wherein the biasing of the sealing means is by way of a spring received in a sub-chamber within said chamber, the sub-chamber containing said sealing means as a sliding fit.

18. A valve as claimed in Claim 17, in conjunction with an actuator, in use, wherein said sub-chamber has at least one opening which can allow communication, through said first opening, between the part of said chamber around said sub-chamber and the exterior of the chamber upon action of said actuator to move said sealing means so as to open said first opening.

19. A valve as claimed in Claim 18, wherein when said sealing means closes said first opening, it also closes the or each opening.

20. A valve as claimed in any one of Claims 1 to 19, wherein the first body part is resiliently deformable to allow release of the second body part therefrom.

21. A valve as claimed in Claim 8, wherein a portion of the first body part extends below said base and is resiliently deformable to allow separation of the first and second body parts.

22. A valve as claimed in any one of Claims 1 to 21, wherein an external surface of the first body part has a screw thread thereon.

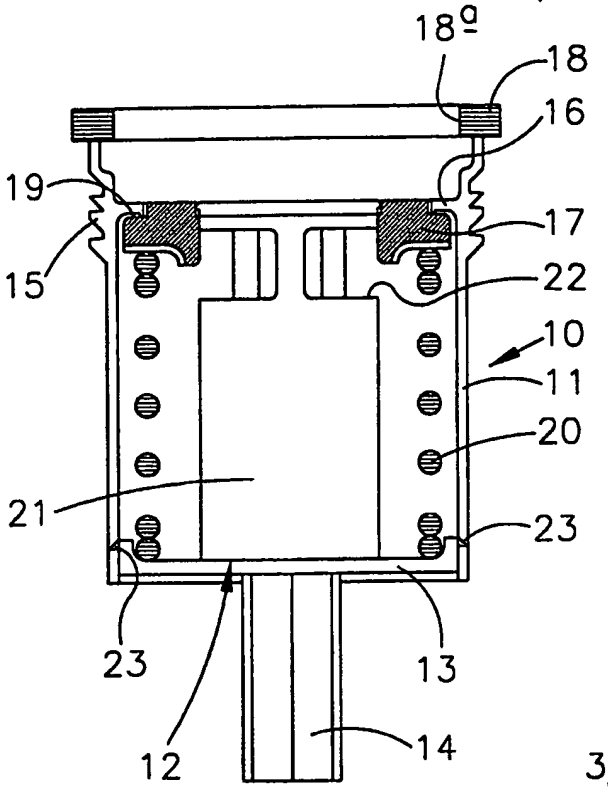


FIG 1

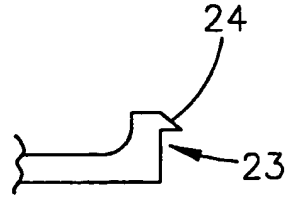
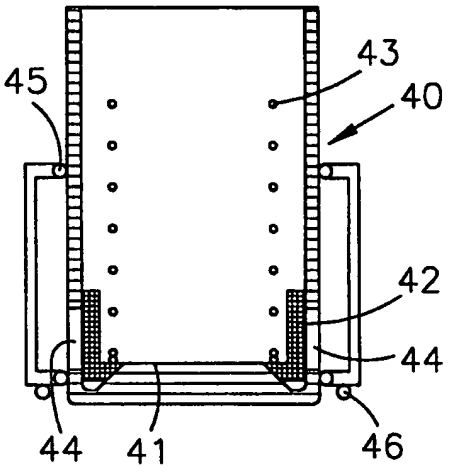


FIG 2



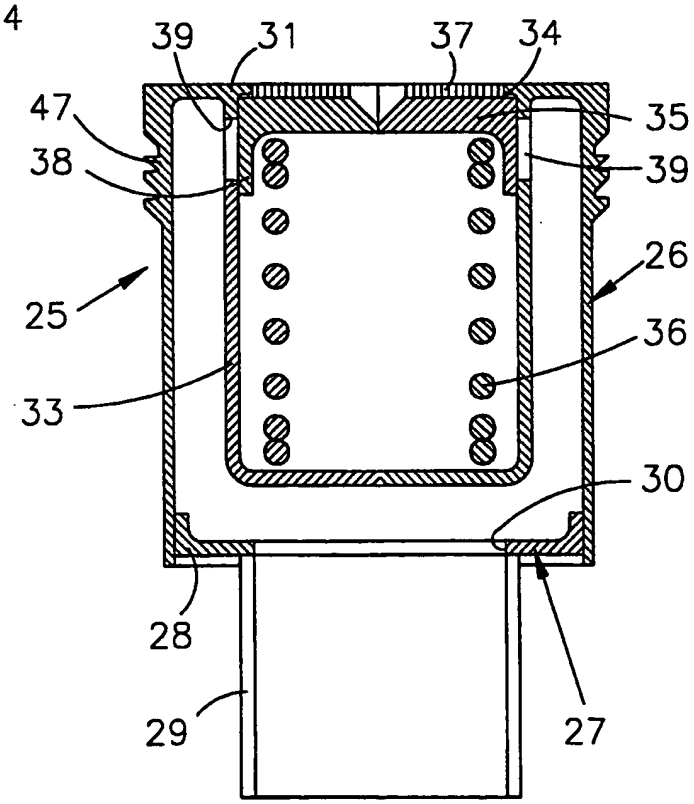


FIG 3

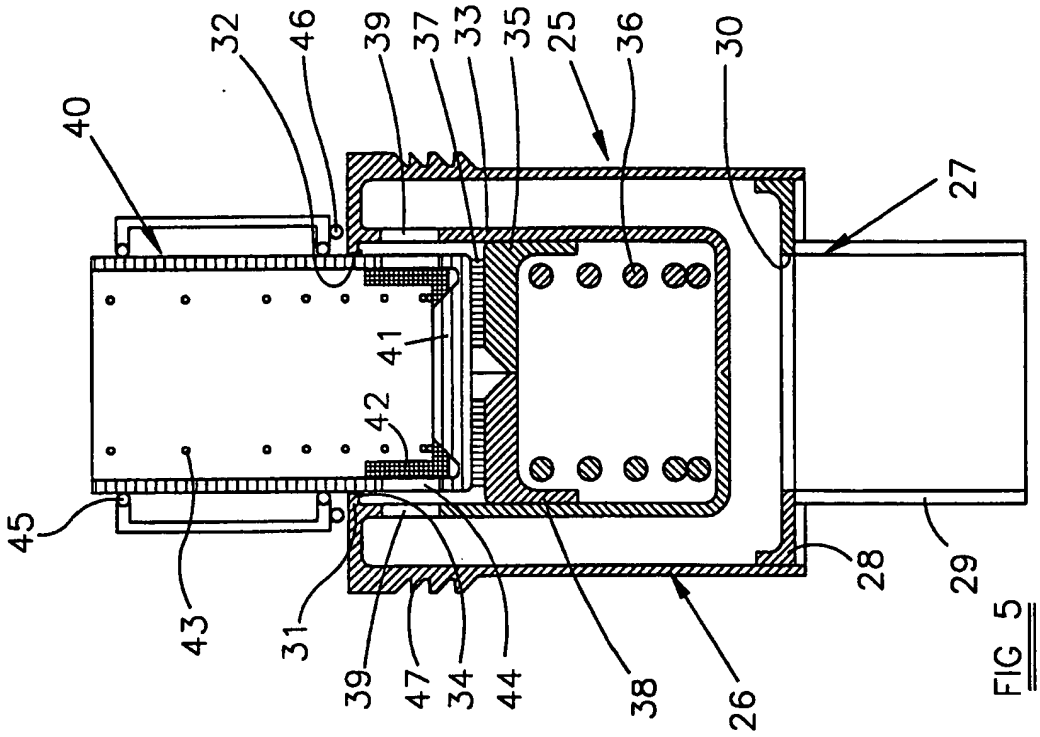

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FIG 5

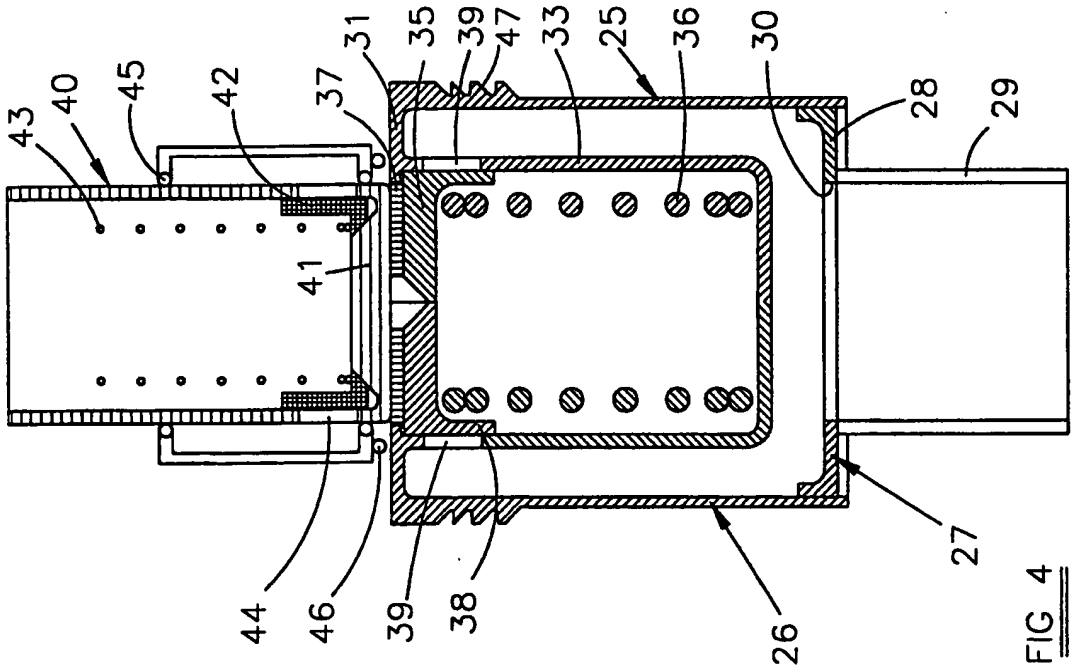
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FIG 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 99/04222

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65D 83/44 // F16K 21/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B65D, F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	US 4142658 A (GOLDING), 6 March 1979 (06.03.79), column 4, line 67 - column 5, line 31, figure 1, pos. 14,30-36,42	1-22
X	US 4351456 A (NEZWORSKI), 28 Sept 1982 (28.09.82), column 7, line 34 - column 8, line 16, figure 1, pos. 29-34	1-22
X	US 5242092 A (RIIS ET AL), 7 Sept 1993 (07.09.93), column 3, line 56 - column 4, line 26, figure 1, pos. 3,10,11,32	1-22

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search
31 March 2000

Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 99/04222

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5526965 A (DEGENKOLBE ET AL), 18 June 1996 (18.06.96), column 4, line 20 - line 40, figure 1, pos. 7,14 -- --------	1-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
PCT/GB 99/04222

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4142658 A	06/03/79	AU 518262 B	24/09/81
		AU 3232678 A	19/07/79
		DE 2737500 A	23/02/78
		DK 369877 A	21/02/78
		IE 46040 B	09/02/83
		JP 53025187 A	08/03/78
		BE 857965 A	16/12/77
		GB 1577117 A	22/10/80
		GB 1577119 A	22/10/80
		DE 2713635 A	29/09/77
		DK 132477 A	28/09/77
		DK 146003 B,C	16/05/83
		IE 44796 B	07/04/82
		JP 1280014 C	13/09/85
		JP 52120086 A	08/10/77
		US 4150771 A	24/04/79
US 4351456 A	28/09/82	NONE	
US 5242092 A	07/09/93	AT 107265 T	15/07/94
		DE 69010005 D,T	17/11/94
		DK 199790 D	00/00/00
		DK 489829 T	24/10/94
		EP 0489829 A,B	17/06/92
		ES 2055919 T	01/09/94
		WO 9102694 A	07/03/91
		DK 418289 A	25/02/91
		JP 2706566 B	28/01/98
		JP 5501840 T	08/04/93
US 5526965 A	18/06/96	AU 3352393 A	15/08/94
		BR 9307775 A	31/10/95
		CZ 281647 B	13/11/96
		CZ 9501856 A	17/04/96
		DE 59303044 D	00/00/00
		DK 680453 T	25/11/96
		EP 0680453 A,B	08/11/95
		JP 8505590 T	18/06/96
		PL 171457 B	30/04/97
		PL 309984 A	13/11/95
		RU 2093455 C	20/10/97
		WO 9416985 A	04/08/94